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The past few months have been marked by key strategic changes for Haldex. It is with great pleasure and satisfaction that I affirm that during the spring, Haldex was able to acquire Concentric, a world-leading supplier of oil, water and fuel pumps for medium- and large-size diesel engines. Equally satisfying is the establishment in Mexico of a new plant to meet the needs of our North American customers.

Our acquisition of Concentric enables us to supplement our existing product area and strengthen our offering to the diesel engine market. Concentric is now being integrated into Haldex Hydraulic Systems, considerably increasing the size of the division.

Demand is rising for increasingly efficient pumps for diesel engines – such as fuel pumps for common rail systems – brought about by a trend toward increasingly strict requirements for fuel efficiency and tighter legislation internationally.

Customers will benefit from the two companies’ strong focus on technological leadership, particularly in terms of emissions and fuel reduction. Haldex already has a strong position in these areas with products such as Alfdex and Varivent.

Concentric will strengthen the global range of the Hydraulic Systems division in the market for diesel engines. The acquisition strengthens our presence in China and India, for example.

It also means we will be able to achieve synergies in production, purchasing and R&D. The acquisition is an initial step in the strategy of optimizing Haldex’s group structure and creates a strong Hydraulic Systems division within Haldex.

Overall, we are extremely pleased and satisfied with the transaction and the opportunities and advantages it brings.

The Traction Systems division is also looking at attractive new opportunities after the events of the past few months – namely the opening of the new plant in Mexico at the beginning of the year and our investment in a new production line at the plant in Landskrona, Sweden.

The plant in Mexico, which is world-class, manufactures fourth-generation four-wheel drives and electronic differential brakes for a number of General Motors platforms. The first car model to be equipped with the new four-wheel-drive system is the Saab 9.3 XWD. Haldex’s cross wheel drive contributes greater safety and favorable driving characteristics in the new Saab model. Haldex is a market leader in adjustable four-wheel-drive systems, commanding slightly more than 30 percent of the market in Europe.

The investments in Landskrona meet the need for deliveries to VW Tiguan. This year, Haldex Traction and VW can also look back at 10 years of cooperation. This is a good example of how Haldex cooperates with its customers – closely and for the long term.
Haldex among 2007’s top climate improvers

According to the leading Swedish insurance company Folksam’s Climate Index, which presents a quantitative measurement of the environmental impact caused by listed companies’ production operations, Haldex is best in the industry and third best in Sweden at reporting its impact on the environment.

Climate Index 2007, which was carried by the Carbon Disclosure Project (CDP), was based on a poll of 2,400 companies, of which 70 Swedish companies responded. The answers from the poll were evaluated by CDP, which then ranked the companies.

None of the companies achieved the highest possible score of 100, but the top-ranked company was close with a score of 91 and Haldex was not far behind with 86 points.

“For several years, environmental issues have been a natural part of Haldex’s daily operations and an important aspect of the Group’s brand. Naturally, it feels great that we are being recognized for this,” says Joakim Olsson, President and CEO of Haldex.

The Group’s business concept includes focusing on products that improve the environment. One such example is Haldex’s Varivent product, which makes it possible to reduce emission levels of nitrogen oxides from diesel engines, while at the same time providing low fuel consumption. Another example is Alfdex, a system for separating oil particles in the ventilator air from diesel crankcases, known as crankcase gases.

The crankcase of a diesel engine in a truck normally emits 6 to 9 liters of lubricant oil per 1,000 hours. Alfdex practically eliminates these emissions. Haldex’s environmental work takes into account the total environmental impact caused by the manufacture, use and scrapping of the company’s products. It is based on a lifecycle perspective.

“Our tangible environmental action plans are formulated locally to enable optimum adaptation to each respective unit’s operations and environmental impact. The results of these efforts are followed up annually at the Group level and total CO2 emissions are registered,” explains Joakim Olsson, President and CEO of Haldex.

Four-wheel drive in new Volkswagen

Haldex receives new order from Volkswagen for four-wheel drive system, expanding previous order from 2004. Haldex is to supply its electronic four-wheel drive system, which is based on the fourth generation Haldex coupling, for a new platform from Volkswagen. Deliveries are expected to commence in the autumn of 2008.

The new order is an extension of the existing program for the Volkswagen Group. The new platform is the first in its segment for Haldex. The four-wheel drive system will be manufactured and delivered from the Haldex plant in Landskrona.
**SCANIA chooses Alfdex for new engines**

SCANIA has once again chosen Alfdex for the cleaning of crankcase gases, this time for its new 9 and 13 liter, Euro 5 compliant engines. The Alfdex variant selected offers a degree of cleaning that is higher than ever – it makes crankcase gases almost 100% free of oil and soot.

“This order, the second from Scania, confirms and expands on the cooperation we began back in 2002,” says Mats Ekeroth, Alfdex president. “In total, we now have acknowledged orders worth around SEK 1 billion (EUR 100 million) over the coming 3 to 5 years.”

International and Detroit Diesel, two major US diesel engine manufacturers have also chosen the Alfdex oil mist separator system, for deliveries during 2007, 2008 and 2009. Combined, the two orders are worth about SEK 200 million to Alfdex AB, the world’s leading supplier of proprietary crankcase gas cleaning solutions.

**Haldex receives German EUR 80 million order**

The CVS Division has secured a five-year order worth approximately SEK 800 million (EUR 80 million) from the German company BPW (Bergische Achsen), Europe’s largest manufacturer of trailer axles.

The order is for Automatic Brake Adjusters, ABAs, developed jointly by Haldex and BPW. The brake adjusters, ECO-Master II, are based on the latest generation of ABAs from Haldex. ECO-Master II replaces BPW’s previous generation of proprietarily manufactured ABAs.

This is the largest individual order Haldex has ever received for brake adjusters.

**Compressortest lab inaugurated**

A new compressor test lab in Heidelberg (Germany) was inaugurated on March 6. The new lab permits testing of not only compressors but all air management system products such as the latest version of ModulAir. The lab also allows personnel to conduct tests that are identical to those performed at the Haldex test lab in Kansas City (USA). The lab will help Haldex strengthen systems’ expertise and improve the quality and performance of air management components for trucks and trailers.
A decade of tech

Volkswagen Group and Haldex have enjoyed a healthy working relationship for over a decade. Indeed, Haldex worked closely with Europe’s largest car manufacturer from its very early days. Now, the VW Group has chosen the latest AWD system, known as Generation IV, for its new model, the Tiguan, to conquer the compact SUV sector.
In 1991, Haldex drew up a cooperation agreement with former race car-driver Sigge Johansson, responsible for several inventions within the automotive industry, to work on one of his inventions for a friction coupling in the differential. Haldex was given exclusive rights to develop, manufacture and market the units.

The Swedish company adapted Johansson’s invention, developing a software-controlled electronic regulator that was built into the coupling for four-wheel drives. This software interacted with other systems in the vehicle, for example, ABS brakes and the electronic stability control system (EPS).

In the mid 1990’s, the VW Group faced a major challenge in the development of VW Golf Fourth Generation. VW realised that its old Viscotechnik was out of date. It only improved traction, says Dr Wolf-Rüdiger Lutz, head of the VW department dealing with drive train development from 1994 to 2004 and now a freelance consultant, working entirely for VW.

“For the VW Golf Fourth Generation VW looked for a better system. Haldex had presented a predecessor of its all-wheel drive system to our research division in 1994. Our development division decided to use it for the Golf 4. But with the first endurance tests we had problems which...
meant we had to work very closely with Haldex to solve them. We had to get more involved than we would normally like to get involved with a supplier.”

The decision to adopt the Haldex technology was taken in 1996, and the series started in 1998. Several prototypes were tested extensively on Volkswagen cars in Germany in 1992 and, during the winter, in northern Sweden.

HALDEX WAS Nominated supplier to VW in 1996, with planned production to start in 1998. “The basic function was always good; we were convinced by the product and we wanted to help Haldex get it to production standard,” says Dr Wolf-Rüdiger Lutz. “Because of our extra commitment, we were contractually sole user of the product for the first 18 months.”

On January 1, 1998, Haldex Traction AB was formed, with 30 employees. Today about 350 employees work for the company in Landskrona, Sweden.

vw and Haldex worked together well from the start. “The chemistry is just right,” says Dr Hubert Gröhlich, currently responsible for the development of double clutch transmission at VW and until recently, departmental head of manual transmission and all-wheel drive components. “I’ve always really enjoyed working with my Swedish colleagues. The Swedish mentality is sometimes different to the German
mentality but we’ve nevertheless succeeded in working well together.”

Reliability and trust has played a key role in their partnership. “Haldex is a reliable partner who has effectively worked for us,” continues Gröhlich. “We value their loyalty.”

In addition, VW has been impressed by the way that Haldex has solved any problems that have occurred. “What VW values about subcontractors, like Haldex, is their ability to rectify any problems that may occur with the technical systems, work independently through any issues or problems and find fast and sustainable solutions,” he explains.

Most recently, VW has chosen a new version of Haldex Traction’s 4motion All Wheel Drive (AWD) system, known as Generation IV, for its Tiguan vehicle, with which it is entering a buoyant sector of the motor industry, namely compact Sports Utility Vehicles (SUVs).

“It’s always been important for VW to introduce new products. Our customers demand and expect top quality, competitively superior products, and at an attractive price,” says Gröhlich.

Generation IV offers additional advantages to Haldex’s permanent 4-wheel drive systems, which automatically vary the amount of drive delivered to the front and rear axles, depending on driving conditions. Generation IV uses an external pump, which creates a pressure separate from that created by the axle slippage, meaning it can react spontaneously.

What is more, Generation IV offers a significant cost advantage for VW and other car manufacturers. “Not only are we impressed by the technical aspects of Generation IV, the price is also very good and has allowed us to reduce costs,” says Gröhlich.

To meet this demand, Haldex has recently invested in a new production line at the Traction-plant in Landskrona, Sweden.
Haldex has acquired UK company Concentric. Haldex and Concentric shares the same company cultures with a similar focus on innovative engineering solutions, and the new organization is poised to strengthen operations worldwide.

Concentric is the new Hydraulics lever
THE ACQUISITION OF CONCENTRIC is very strategic to Haldex. Concentric is a leading supplier of oil, water and fuel pumps for medium- and heavy-duty diesel engines. The company’s strength in terms of products complements Haldex’s range in its Hydraulic System division and enhances its offering to the diesel engine market.

“Concentric represents an ideal acquisition for Hydraulic Systems and will add to Haldex’s focus on leading edge technology and growth in structurally interesting niches. The acquisition is a first step in the strategic plan to optimize the Group structure and creates a strong Hydraulic Systems division”, says Joakim Olsson, President and CEO of Haldex.

Over time Haldex has reviewed its development opportunities in the Hydraulic Systems division and determined that products for diesel engines that focus on reducing emissions and fuel consumption is an attractive area. Haldex already has a strong niche position with products such as Alfdex and fuel pumps. Concentric also has a strong position in fuel pumps for diesel engines.

“In terms of brands and market position, both Haldex and Concentric embody similar core values of quality and technological innovation,” says Ian Dugan, former CEO of Concentric. “The two businesses are complementary in terms of products, with Haldex specializing in hydraulic pumps and Concentric in engine pumps. This means increased potential for both.”

DUGAN HAS A MECHANICAL engineering background, and he has had a series of positions in design, manufacturing operations, product development and sales, followed by 15 years in general management. He has been with Concentric for the past five years, while growing the business there. Dugan has now taken on the role of head of Haldex’s Hydraulic Systems division.

Concentric’s top management will continue to work within Hydraulics, bringing with them valuable experience and management skills.

“Our customers will benefit from the strong focus on technology leadership, particularly in improving environmental benefits and energy efficiency,” Dugan says.

Dugan says that, as the new head of Hydraulics, his first moves will be to unlock opportunities in both companies, while accelerating growth by taking the best expertise and leveraging it across the business.

“It is important to have the people to share their knowledge in both directions to make the combined organization stronger,” he explains.

Thanks to the acquisition of Concentric, Hydraulic Systems will be able to capture a larger share of the diesel engine market, with a focus on products for emission reduction and fuel-efficiency improvement.

“Concentric provides innovative variable-flow oil pumps, which reduce emissions and energy consumption,” Dugan says. “Demand for increasingly efficient pumps for diesel engines, such as fuel pumps for common rail systems, is growing, due to increasingly strict fuel-efficiency and environmental requirements. Through
innovator in selected areas,” Thomas Holm explains. “The requirements of the vehicle industry demand that innovation be combined with strong market positions. Against this background, Haldex has decided to focus on segments where the group can achieve sustainable market positions based on innovative and leading products, providing a foundation for sustainable growth and good profitability.”

The acquisition of Concentric fits with this focus and is very much balancing Haldex’ current offering in the diesel engine product area. “The stringent environmental requirements on engine manufacturers support the development prospects within this segment,” he says.

Expertise

Leading supplier for diesel engines

CONCENTRIC IS A WELL established company in designing and manufacturing oil, water and fuel pumps for medium- and heavy-duty diesel engines used in commercial applications, trucks and construction equipment.

For a number of years, Concentric PLC has been a major supplier to the world’s diesel engine manufacturers, supplying oil, water and fuel transfer pumps, as well as coolant pumps and fan support brackets for transmissions and compressors. End applications range from trucks and buses to materials handling, construction, agricultural and off-highway machinery.

The product range encompasses oil, water and fuel transfer pumps for diesel engines with capacities of 1.5 liters to more than 30 liters.

“Concentric has a long track record of innovation and is a technological leader in three principal applications – lubrication, cooling and fuel transfer,” says Ian Dugan, former CEO of Concentric and the new head of Haldex’s Hydraulics Systems division. “The company can offer unrivaled experience in designing for the increased performance and torque capacity of the latest engines. We also design complete fluid systems, including pump, filter and cooler.”

Concentric’s global manufacturing and sales network, including facilities in the US, the UK, China and India complements the global presence of Haldex.

The company has a comprehensive customer base, including leading diesel engine manufacturers such as Caterpillar, Cummins, John Deere, Iveco and Daimler.
The Concentric variable flow pump

THIS IS ONE of Concentric's newly developed products, and a result of leading edge technology. The product has primarily been developed for diesel engines, but can also be used on other engines that need water-cooling.

The flow pump is variable in that it delivers exactly the amount of water required to maintain the right temperature. This finesse means that there is no need to take energy from the engine without reason. This contributes to a reduction in fuel consumption of between 2% and 4%, depending on how the engine is used.
New plant opened in M
Haldex increases its manufacturing footprint in Mexico through the completion of the new plant. The main reason for the establishment of the facility is the growing demand Haldex sees in terms of the use of car platforms that include limited slip couplings and differentials.

The plant is in the Castro del Rio Industrial Park in Irapuato, in the Mexican state of Guanajuato. The facility comprises manufacturing, warehousing, logistical functions and administrative space for 70 employees with room for future expansion. It is located near several facilities operated by automakers and suppliers.

“The creation of this world-class facility underlines the company’s unabridged commitment to excellence not only in the area of innovation, but also in the realization of modern and efficient manufacturing facilities on a global basis” says Joakim Olsson, President and CEO of the Haldex Group.

This new Mexican entity offers a major production capacity in terms of the fourth generation, electronically controlled limited slip couplings and differentials in Irapuato in Mexico.
controlled, limited slip couplings and differentials (e.g.,)
while also serving a number of All-Wheel Drive platforms
at General Motors. These platforms comprise several Gen-
eral Motors brands. In this way, the General Motors world-
wide assembly plants will receive torque transfer technol-
gy manufactured by Haldex Irapuato.

“We began searching for a suitable place in Mexico to
locate our new plant after we were nominated supplier to
General Motors,” says Ulf Ahlén, Head of the Haldex Trac-
tion Systems Division. “We deliver our products, which are
manufactured in the new plant, to American Axle, which
makes car rear axles. For us, it was very fitting, and made
a lot of sense, to locate our plant very close to American
Axle’s factory in Mexico.”

The facility will ramp-up its output all through 2008
as additional All-Wheel Drive models are launched by the
General Motors brands. It also constitutes one of the pillars
for Traction’s continued strong expansion and growth in
the Americas with General Motors and other automakers.

“Haldex Traction already had reached a powerful posi-
tion in Europe,” Ahlén says. “Our next strategic step is to
expand our operations in North America. The plants in
Europe and now in Mexico truly fit both our needs and the
ones of our customers.”

Ahlén points out the importance of the strategic ambi-
tion to offer Haldex’ extensive global customer base a local
presence and manufacturing capabilities for products, such
as the limited slip coupling and differentials.

“It is crucial to have operations close to the markets in order to be
able to understand customer needs and being able to serve them in the best possible way,” he explains.

“Thanks to our new location, we can understand the mar-
et even better, and we can have more and easier connec-
tions with our customers.”

The first vehicle model to feature the systems produced
in Irapuato is the recently introduced Saab 9-3 XWD.

“In North America, there is a large need for four-wheel drive systems, while there is also a need to reduce the costs
for these systems,” Ahlén says.

Ahlén adds that General Motors also has a plant in Mex-
ico where future models of Saab and other GM brands will
be manufactured.

“We have now installed two new and identical assembly
lines at our plants in Landskrona and in Irapuato,” he says.

“This ensures that we have the latest technology in terms of
assembling the products.”

It is crucial to have operations close to the markets in order to be
able to understand customer needs.

Ulf Ahlén

Strawberry region is Mexico’s
automotive Silicon Valley

LOCATED AT THE FOOT of the Arandas
mountain in the south central region of the
Mexican state of Guanajuato, Irapuato is
renowned for its strawberry production. It is
sometimes even given the title of strawberry
capital of the world.

However, the agricultural business is being
heavily rivaled by the steep rise of companies
in the automotive industry locating in the
area. Guanajuato is one of three states that
comprise Mexico’s emerging high-tech region.

Today, Guanajuato is especially known for
extensive, high technology investments by
global vehicle manufacturers and suppliers.

Ulf Ahlén, Head of the Haldex Traction
Systems Division, mentions for instance that
systems supplier and integration partner
for transmission and drivetrain systems,
GETRAG Corporate Group, is present at the
Castro del Rio Industrial Park in Irapuato. The
Schaeffler Group, which is a leading world-
wide manufacturer of rolling bearings and
linear products, also has started operations at
Castro del Rio.

“We evaluated several different alternatives
for establishing a plant in Mexico,” Ahlén says.

“We found that the city of Irapuato was the
best option.”

Strawberry region is Mexico’s
automotive Silicon Valley
XWD prototype order from Hyundai

HALDEX IS SUPPLYING an electronic all wheel-drive (AWD) system, based on the Haldex Gen IV limited slip coupling and the all-new Haldex electronic limited slip differential (Haldex XWD), to Hyundai-KIA Motors for a prototype installation. In conjunction with the coupling, the electronically controlled add-on module becomes an integrated part of the power and control systems of the longitudinal device thereby offering a flexible and cost-effective solution for enhanced vehicle dynamics. It can be used in vehicle product lines to control side-to-side torque distribution, and constitutes an efficient alternative to brake-based systems that dissipate power for control.

“The cooperation with Hyundai-KIA Motors manifests our commitment to meet customer needs through innovation, and is a first step for the Haldex coupling into the Asian market,” says Haldex CEO Joakim Olsson.

FOCUS ON 6 SIGMA

“6 SIGMA” IS A STATISTICAL term that refers to the very low failure rate of 3.4 defects per million. It is also the name of a data-driven process improvement methodology that can be applied to any industry or service. 6 Sigma is a recommended problem-solving tool of The Haldex Way, the Haldex program for achieving customer satisfaction and world-class performance.

Two key elements of the 6 Sigma method are DMAIC (define, measure, analyze, improve, control) problem-solving methodology and toll gate reviews, formal project reviews conducted at the end of each DMAIC phase.

In recent months, a number of Haldex employees have received 6 Sigma black belt certification. Black belt training is conducted by Caterpillar University, a training unit of the Caterpillar company. Participants in this rigorous four-week training, held over four months, learn and practice DMAIC problem-solving on actual projects within their own divisions. Toll gate reviews are conducted by the Caterpillar training team and participants’ own senior management. Participants must also pass weekly tests and a final exam.

For his black belt training project in August, Anders Andersson, improvement coach with the Foundation Brake unit in Landskrona (Sweden), investigated the cause of a chronic bottleneck at one of the unit’s testing stations. Using 6 Sigma methodology, the project team discovered that about 600 unnecessary test runs were occurring each week. The team identified the underlying problem and reduced the number of unnecessary runs by 90% for an annual cost savings of SEK 500,000 (EUR 50,000). Furthermore, in the course of the bottleneck project, the team identified another candidate for Six Sigma analysis, a wobbly M4 screw that caused a two-minute loss per hour in the assembly process. Says Andersson, "Neglecting small process disturbances like this one costs Haldex about SEK 100,000 a month (EUR 10,000)." The team also addressed the M4 screw problem. “At Haldex, we use the DMAIC problem-solving process to reduce variation to 3.4 defects per million opportunities,” says Bruce Silberman, change agent. “The ‘black’ belt is the project manager who is responsible for running the project and for getting results. The black belt achieves this by training ‘green’ belts (other project team members), holding toll gate reviews, communicating with project stakeholders, and being aligned with customer and business needs. Haldex is in the process of getting at least one black belt per production site and multiple black belts for sites with more than 100 employees.”
Testing the wire

Materials for engineering purposes are only as good as their weakest point, and the Foerster Group of Reutlingen, near Stuttgart in Germany, has dedicated itself for the last sixty years to the task of making sure that metal components are as perfect as can be. Haldex Graphyttan Wire has been using Foerster test equipment for over thirty years.

**THE AUTO INDUSTRY’S DEMANDS** for cars with ever higher performance characteristics must be met primarily by the industry’s subcontractors. Consequently, suspension manufacturing customers of Haldex Graphyttan Wire are making increasingly high demands on the wire delivered. The properties of the wire, on which the suspension’s performance depends, are determined by the profile, or surface, of the wire.

Foerster and Haldex Graphyttan Wire have cooperated for several years on developing the technique for surface testing. This involves the technology for testing a wire that has a non-round – that is, oval or egg-shaped – cross-section. The close cooperation between Foerster and Haldex also includes modifications of the mathematical calculations in the software used.

Of the various modifications, Haldex has standardized its machines to enable the operators to work flexibly between several lines, using standardized procedures.

A coil of wire has to put up with a lot. The metal in it will have been heated up to more than 1,000°C and stretched until it is as thin as is required. It may have its surface planed off to make it really smooth, and then it will be rolled up on a coil. After that, if it is being used for springs, it will be twisted and pressured until all it wants to do is to bounce back to its original length. There are plenty of opportunities for flaws–like cracks, holes or other irregularities–to develop in this process, and the Foerster Group specialises in using electro-magnetic test systems to spot them—in wire, tubes or bars, as well as in automotive components and aircraft surfaces. The company also makes equipment to find unexploded ordinance and has provided sensors for space missions to align satellites with the magnetic field of the Earth.

**FOERSTER WAS FOUNDED** in 1948 by Dr. Friedrich Förster, who had developed an industrially useful method of utilising eddy currents to check metal surfaces. “He was a man of genius and able to pick up new technical trends,” says company spokesman Michael Urban.

As with many engineer-led companies at the time, it was the enthusiasm of the technicians which determined company policy. Now of course, Felix Förster in the third generation runs the company with an approach which is far more oriented towards the needs of the customers. And, says Urban, the company is doing well.

“We’ve been growing very fast in the last three years because of the growth of the steel industry,” he says. “In fact, we hired 25 new employees in 2007.”

**Doctor Friedrich Förster,** the company’s founder, was awarded the Federal Cross of Merit in 1976.
EDT in short

EDDY CURRENT TESTING belongs to the non destructive electromagnetic test procedures and works by creating a magnetic field in a metal and noting where the field exhibits irregularities. There are two methods employed: in one, wire (or a tube or bar) is led through an encircling coil; in the other, a number of small scanning probes rotate around the wire as it is drawn through.

The encircling coil allows high throughput speeds of more than 100 m/s, and is very good at detecting short flaws and transverse flaws. The rotating probes are very sensitive at detecting longitudinal flaws, but allow maximum throughput speeds of 4 m/s.

Many installations use both methods: they can run the test line at maximum speed, even if there are gaps between the scanning tracks of the rotating probes, and rely on the encircling coil to catch any flaws in between.

Foerster, says Urban, is the market leader in semi-finished product testing

That may be why Haldex Garphyttan Wire chose to ask Foerster to help with a problem. Modern spring wire is often not round: as wire is bent to shape a spring, the inside of the curve is compressed and the outside expanded. That has led to the development of wire which has less mass on one side and more on the other. But Foerster’s wire testing was based on running round wire through round holes. Any irregularity in the distance between the surface of the wire and the test probe would result in an uncertain result.

“We developed two methods of dealing with the problem,” says Günther Stritzke, Application Manager in the Test Systems Divisions. “In the case of the encircling coils, we developed coils shaped like the wire, and in the case of the rotating scanning probes, we developed electronic solutions in which calculations compensate for the variations in distance.”

But, whereas a round wire is round whichever way up it is, both those solutions mean that the wire must always run precisely in the same position. “So we had to develop special guides to ensure that the wire always ran true,” explains Stritzke. Haldex’s query has led to new standards: “Everyone is using that technology now.”

Such expertise has its price: “We know that our test equipment is not the cheapest,” Urban points out, “but European steel makers know they can only be successful if their product is clearly better than the low price competition, and that means they need our test equipment to monitor their quality.”

Foerster’s newest development is a clever little sensor system which fits inside a wire-drawing machine. The Minicoil is about 20 cm long, and includes an encircling test coil, a magnetiser and a demagnetiser. “It’s proving very popular,” says Urban. “It works with wire of between 0.5 and 4.5 mm in diameter. Usually encircling coils aren’t as sensitive in detecting flaws as rotating probes, but, with the sensor system Minicoil used on those sizes of wire we are getting excellent test results.”
Harsh testing

The northern Swedish climate is perfect for testing how cars perform in extreme cold and in slippery driving conditions. When it comes to the Saab 9-3 Turbo XWD, the challenge has been to strike an attractive balance between safety and driving pleasure.
The GM/Saab launch of the new Saab 9-3 Turbo xWD, gives the company a leading position in the four-wheel-drive automobile market. A key factor in the development effort was the winter testing of the car in Arjeplog, in northern Sweden.
Bright with gleaming snow under a clear blue late winter sky, the little community of Arjeplog, located in Lapland in northern Sweden, is one of the most idyllic locations you could imagine. But this picture-postcard idyll is also an important hub in the development of the world’s leading cars.

Every year top car manufacturers come to Arjeplog to put their new models through rigorous winter tests. The town, which has a population of 2,000, provides all the right circumstances – large, remote areas, a demanding winter climate and an abundance of frozen lakes to drive on.

Testing is conducted on secret prototypes as well as on individual components for braking systems, chassis or transmissions, with the primary focus being on road-handling characteristics and response times for various systems. The reason for this “live” testing is that realities of winter are difficult to approximate in computer simulations. It is, quite simply, necessary to get out and drive.

GM/Saab is one of the major car manufacturers on site this year. The company came here at the end of November and remained until the beginning of April. During this time, it was in the process of fine-tuning the new Saab 9-3 Turbo xwd, with an awd system from Haldex Traction, and at the same time it tested various engines for an upcoming version of the Opel Insignia, which will also be available with a four-wheel-drive system from Haldex.

Andreas Almqvist bears witness to the fact that car testing works well here. Almqvist is responsible for the awd software in the Saab 9-3 Turbo xwd and is an avid test driver.

“We’ve got everything from test tracks for friction testing to highways, performance tracks and tracks out on the lakes,” he says. “There is even a special freezer garage where we freeze the cars down to –30°C in order to test how they perform in extreme cold.”

GM/Saab is currently on the test tracks to check a fourth-generation awd system from Haldex. It’s this feature that plays a key role in the driving experience on the Saab 9-3 Turbo xwd. And driving experience, says Almqvist, is important. While safety is always the foremost consideration, the car also has to be fun to drive.

“Being somewhat sporty is absolutely essential when it comes to Saab,” he says. “At the same time, as a driver you must feel that you have the car under control and that you feel secure in it. It is a difficult balancing act, but everything indicates that we have succeeded well in that regard.”

THE TESTS ALMQVIST IS INVOLVED IN are actually part of the final phase of a challenging and important project for GM/Saab: to take the lead in the market for four-wheel-drive cars. That was a decision that was made three years ago, according to Anders Tysk, global development manager for awd at GM.

“We decided in 2005 to become the best in the world in awd,” Tysk says. “This is an important market for all car manufacturers. And you can understand why, if you have ever test-driven a car with four-wheel drive. It is so much better than ordinary two-wheel drive that it is almost impossible to go back.”

It is an understatement to say that the testing being conducted in Arjeplog is important, says Tysk.

“We’ve tested the system for two years, making refinements along the way,” he says. “What we are doing now is the very last fine-tuning. These final tests, just prior to launch, will boost this awd solution from being very good to being world-leading. However, we are not only testing in Arjeplog. We test all of our cars on various road surfaces and in various climates as well – in, for example, Spain, Italy and the UK, where we conduct high-speed testing and test out the cars’ driving characteristics on asphalt and gravel. As a Swedish car manufacturer, it is important that our cars work perfectly in all conditions, since we have such a varied climate here.”
HALDEX HAS SUPPLIED GM with its fourth-generation AWD to the new Saab 9-3 Turbo XWD. Specifically, this involves software – the brains of the system – as well as an electronics unit, a hydraulically controlled wet disc clutch and an active transverse differential gear.

Since Saab is based on a front-wheel-drive design, the task of the system is to distribute power optimally between the front and rear axles. The unique aspect of the Haldex solution is that the system can distribute torque to a single rear wheel, allowing for increased traction and turning stability.

This also enables GM/Saab to fine-tune the system so that it fits the unique image of each brand, enabling a car maker to have a sporty four-wheel drive while other makes can be given a more traditional driving experience.

The close cooperation can be observed on site in Arjeplog. Not only are both companies on hand during the weeks of testing, but they also have their offices within walking distance of each other. This is not a remote project but rather total involvement on both sides.

“You can’t be best in the market if you don’t cooperate fully,” says Almqvist. “We’ve been moving in the same direction the whole time, and that is the only way to succeed.”

Anders Tysk agrees. “The reason that we have been so successful is that both we and Haldex want to be the best,” he says. “We have placed very high demands, and Haldex has lived up to them. They have a very extensive range of engineering expertise and innovative abilities. There is a huge difference between the third and fourth generation AWD, and Haldex’ solutions have been very positively received at GM. Considering that four-wheel drive is a growing segment, it is clear that Haldex is doing everything right.”

We decided in 2005 to become the best in the world in AWD. This is an important market for all car manufacturers.

Anders Tysk
Riding the wave of IT

When it comes to IT, India-based Tata Consultancy Services boasts high-end clients around the world – including Haldex.

MUMBAI, formerly known as Bombay, is the most populous city in India, and by some measures the largest in the world. It is the commercial and entertainment capital of India, home to the film industry known as Bollywood as well as corporate headquarters of some of India’s biggest companies. One of the largest is a conglomerate known as the Tata Group, founded by Jamsetji Tata in the middle of the 19th century, at a time when India was just beginning its movement toward independence from British rule. Now comprising almost 100 companies, Tata Group is active in Engineering, Materials, Energy, Chemicals, Services, Consumer Products, Information Systems and Communications.

Tata’s information technology company, known as Tata Consultancy Services, or TCS, also operates on a grand, worldwide scale.

SINCE SEPTEMBER 2006, TCS has been providing modeling, design and drafting work for Haldex, with one coordination engineer onsite in Rockford, Illinois and 3 support personnel in Hyderabad, India. Bill Pizzo, vp of Engineering for the Hydraulics division, comments about the relationship. “We’ve been able to accommodate big jobs more quickly and get cost-reducing changes in place more quickly. As well as cut off the peaks of our load so that we’ve had a more even workflow.” The time-to-market is...
critical, explains Balachandar. He is known to everyone as Bala. Bala is the Business Relationship Manager currently for the TCS-Haldex relationship. Bala points to certain drawings for Haldex now being done in less than two days, which earlier used to take one week.

Operating in 50 countries and with over 108,000 employees, TCS has seven of the top ten Fortune 500 companies as customers. Servicing a wide range of industries, from banking and technology companies to healthcare, manufacturing and telecom, TCS is the largest IT company in India, and one of the largest in Asia.

“Every single business has IT as the backbone of their business,” explains Bala. “It’s maintaining and sharing of information, and as business gets more dynamic you need to share the information globally and in real time,” says Bala. He points to the confidence of its customers and a growing worldwide need for IT services by large companies that have led TCS to achieve revenues of $4.3 billion last fiscal year and an astounding growth of 50 per cent in revenues over the previous year.

ONE OF THE REASONS for the explosion of information technology services is the dynamic, worldwide market. Critical business applications need to be maintained 24 hours a day, and IT affects just about every area of a business: databases, accounting, maintenance and inventory. Dedicated high-speed internet connections make continuous flow of information safe and effective anywhere in the world. Major software vendors who have their own development teams in India also work with TCS. Bala says, “We are maintaining some of their software codes. We can bring innovation which the company may not be able to do itself, or if it can it may not be cost effective and may not have the required resources.”

TCS is based in India, where a very high number of engineers are graduating college every year. Being able to recruit from such a large and qualified engineering base is a big advantage for TCS, as is also the excellent English language skills of its people. Bala, who is living in the United States with his wife and two small children, himself speaks 4 languages. Besides English, he is fluent in his native Tamil language from the south of India, as well as Kannada from a neighboring province. And he can converse in German. TCS recruits globally to bring in multi-language capabilities and cater to different time zones. Also through this, TCS gets access to a huge talent pool across the globe. Almost 10 per cent of its workforce is non-Indian nationals.

Within TCS is a group known as EIS, or Engineering and Industrial Services. It offers a wide spectrum of engineering services and solutions, covering product development, process plant design, plant automation, embedded systems, electromechanical manufacturing services, sourcing and manufacturing solutions, PLM and enterprise asset management. EIS caters to diverse industry verticals comprising Aerospace; Automotive; Hi Tech & Telecom; Medical Devices and Pharma; Industrial Machinery; Energy & Utilities.

Anil Ron is the EIS Practice Director for North America, located in an office in suburban Detroit. He describes the steady and deliberate way they begin work with new clients in the United States. “We partner with our clients to provide innovative solutions that deliver engineering excellence and operational efficiency and help them stay competitive.”

Bala points out that with time-to-market so critical, an additional 8 hour work day overseas helps companies to beat the clock in a highly competitive environment. Global Engineering has been possible due to secure and dedicated high speed internet connections that have made transfer of large files and access to databases possible.
Built his career on passion

Gustav Berggren is radiant as he talks about his job with Varivent. “I have the enormous privilege of working professionally with my great passion and hobby,” he says. In a few years, heavy diesel vehicles will be able to reduce their emissions thanks to the Varivent technology.

AT THE END of the 1990s, when Gustav Berggren conducted a project on exhaust-gas treatment at the Royal Institute of Technology (KTH) in Stockholm, it was a real success. After achieving excellent results, he formed the spinoff company Varivent AB with some fellow students and professor Hans-Erik Ångström.

“I was tempted by research into the HCCI – Homogeneous Charge Compression Ignition – engine of the future, but I invested in my own company instead,” says Gustav Berggren, when Dynamix meets him at his small office in Märsta, north of Stockholm.

Three and a half years ago, Haldex acquired the rights to the technology and since then, Gustav Berggren has also been an employee of the company.
**Varivent – improved fuel economy**

**IN THE YEAR 2000** a project was conducted at the Swedish Royal Institute of Technology (KTH), with the purpose to reduce emissions of nitrogen oxide from heavy diesel engines. The results of the new technology were positive, and resulted in the product know as Varivent.

At the end of 2003, Haldex purchased the rights to the Varivent technology, which the company has continued to develop.

Varivent further develops technology with exhaust gas recirculation (EGR). The aim of this technology is to re-circulate some of the gases to the engine’s cylinder. The exhaust gas functions as an inert gas, meaning a gas that does not chemically react with its surroundings, and reduces the combustion temperature in the cylinder, which in turn reduces the formation of nitrogen oxide.

The Varivent concept uses a highly efficient pump in the form of a venturi pump, a tube that has a smaller diameter in the middle than at the ends. A pump effect is generated in the narrow section with which exhaust gases can be re-circulated.

The new aspect of the technology is that the effect is optimized for all service conditions, at the same time as the exhaust gases are thoroughly mixed, thereby minimizing emissions and fuel consumption.

“We contacted a number of suppliers in the automotive industry, but Haldex was top of the list. They had heard the technology tale of four-wheel drive. Not many companies in the supplier chain have the capacity to develop their own products while also remaining open to external technology and ideas,” says Berggren.

A total of four persons work on the Varivent-project.

“We are a highly goal-oriented team and we complement each other well. All of us are dedicated and the product has huge potential. As a result, we have fun together and everyone puts in that little extra. The enthusiasm is tangible, particularly in contact with customers.”

The factor that has driven Varivent is increasingly intensifying exhaust requirements in the United States and Europe.

Although it is more than 100 years since the internal combustion engine was invented, Gustav Berggren foresees major potential for the technology.

“Although different fuels come and go, the internal combustion engine is unbeatable as a flexible energy transformer, particularly for large and long-distance transport,” he says. The major challenge of the future relates to emissions and energy efficiency. With more stringent demands, increasing resources will be focused on engine development and I am convinced that Haldex’s investment in environmentally friendly engine technology is right.”

In addition to the extremely high performance requirements, Gustav Berggren believes that the most challenging part of the project is its breadth – having the opportunity to work with such aspects as patents, finance, sales and development.

It is noticeable that Berggren enjoys working with his passion. And, like many others with an interest in engines, it began when he went through his moped phase as a teenager. At the time, he owned a total of eight mopeds.

“But at first, my parents tried to bribe me not to have a moped at all,” he grins.

During the winter, his focus is on snowmobile. Last season, Berggren took part in the Swedish enduro snowmobile championship.

According to Berggren, the aspect that distinguishes him from many other engine enthusiasts is his genuine interest in environmental issues and environmental policy.

Gustav Berggren is also content with Haldex. He describes the company as innovative and flexible. And now a breakthrough is on the horizon for Varivent.

“We are working with several different manufacturers in Europe and the United States, says Berggren. I believe that the first trucks to use this technology will be on sale as early as 2010, when the new strict emissions requirements are introduced in the US.”

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Our focus is hydraulic gear pumps, gear motors and hydraulic power units. We are the industry specialists in the development and application of these products. Our commitment to advanced product quality planning (APQP) and operational excellence provides total customer value. When OEM Engineers assess hydraulic gear pumps, gear motors and power units, Haldex is at the top of the leaderboard.